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(54) **Float controlled valve**

(57) A float controlled valve for the cistern has a float (40) cooperatively connected with a plug (181), the upper section of the float (40) being filled with a material having a specific gravity extremely smaller than water, upper section first openings (42) and second openings (41). The openings allow the water in and thereby increase the weight of the float (40).

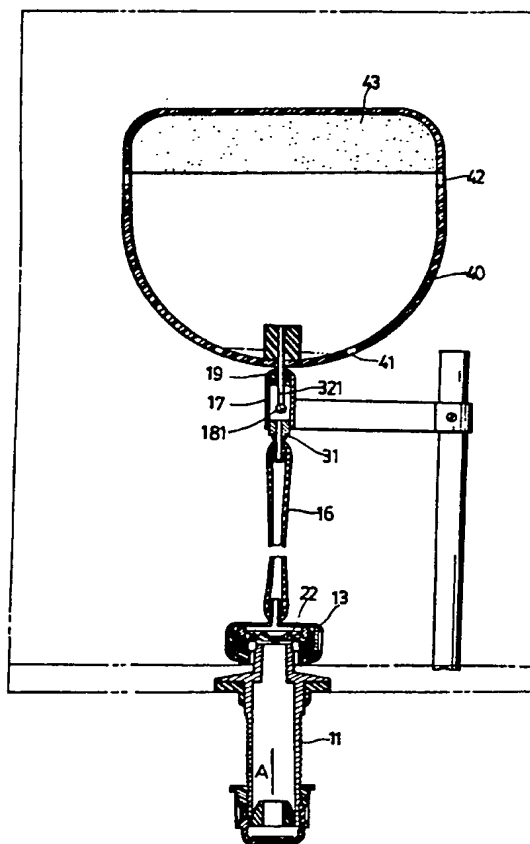


FIG. 2

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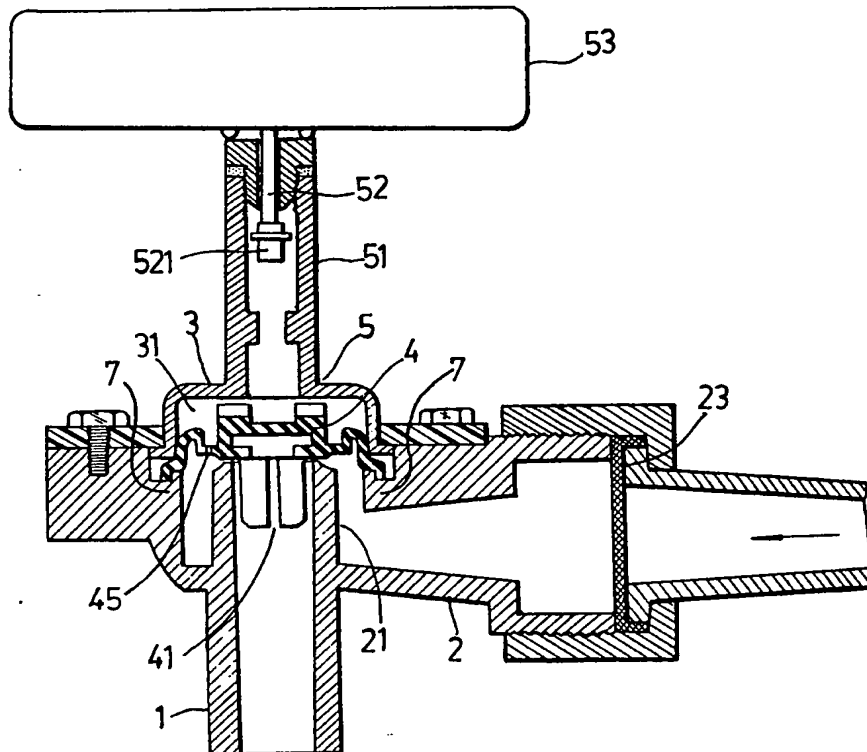


FIG. 1

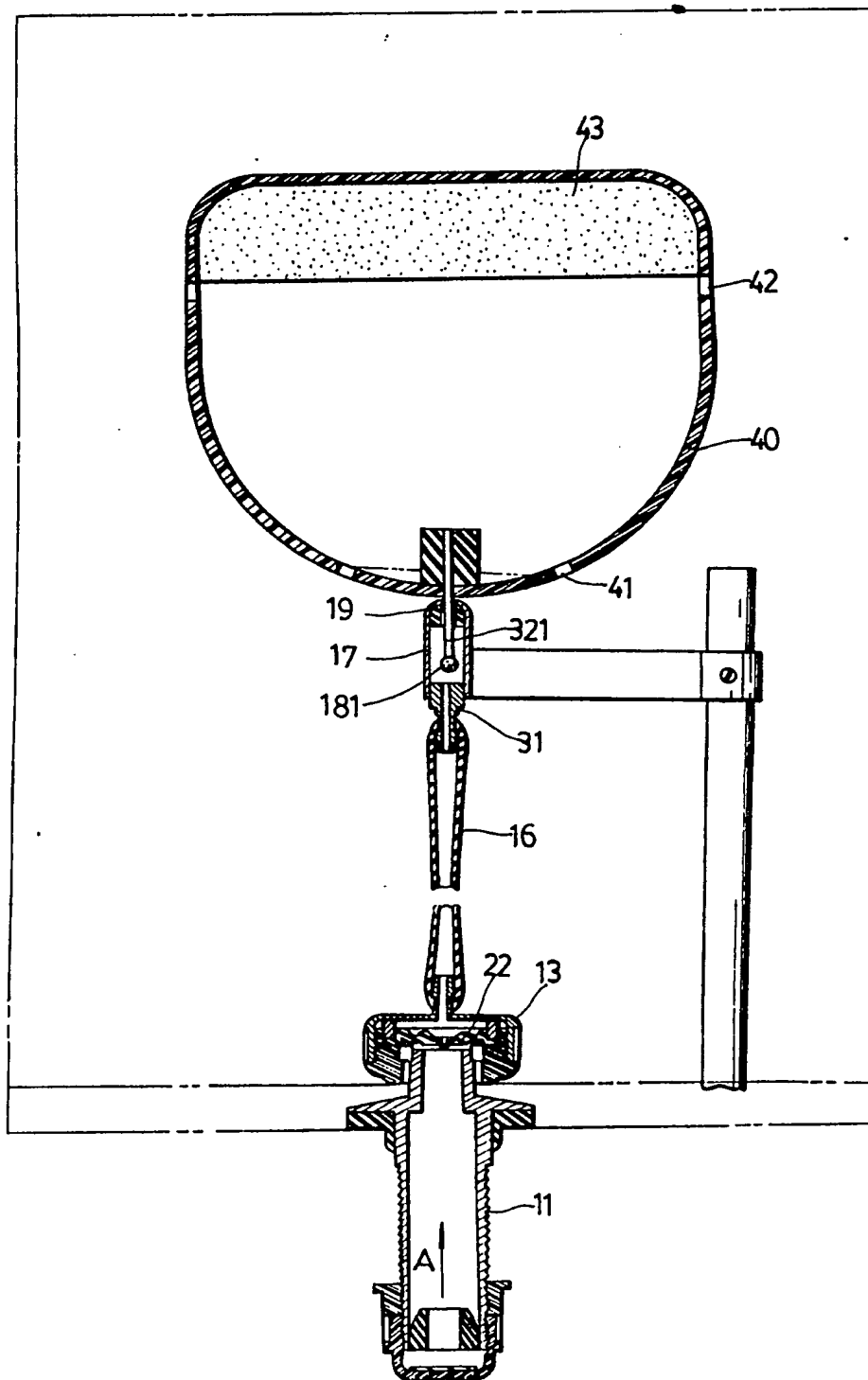
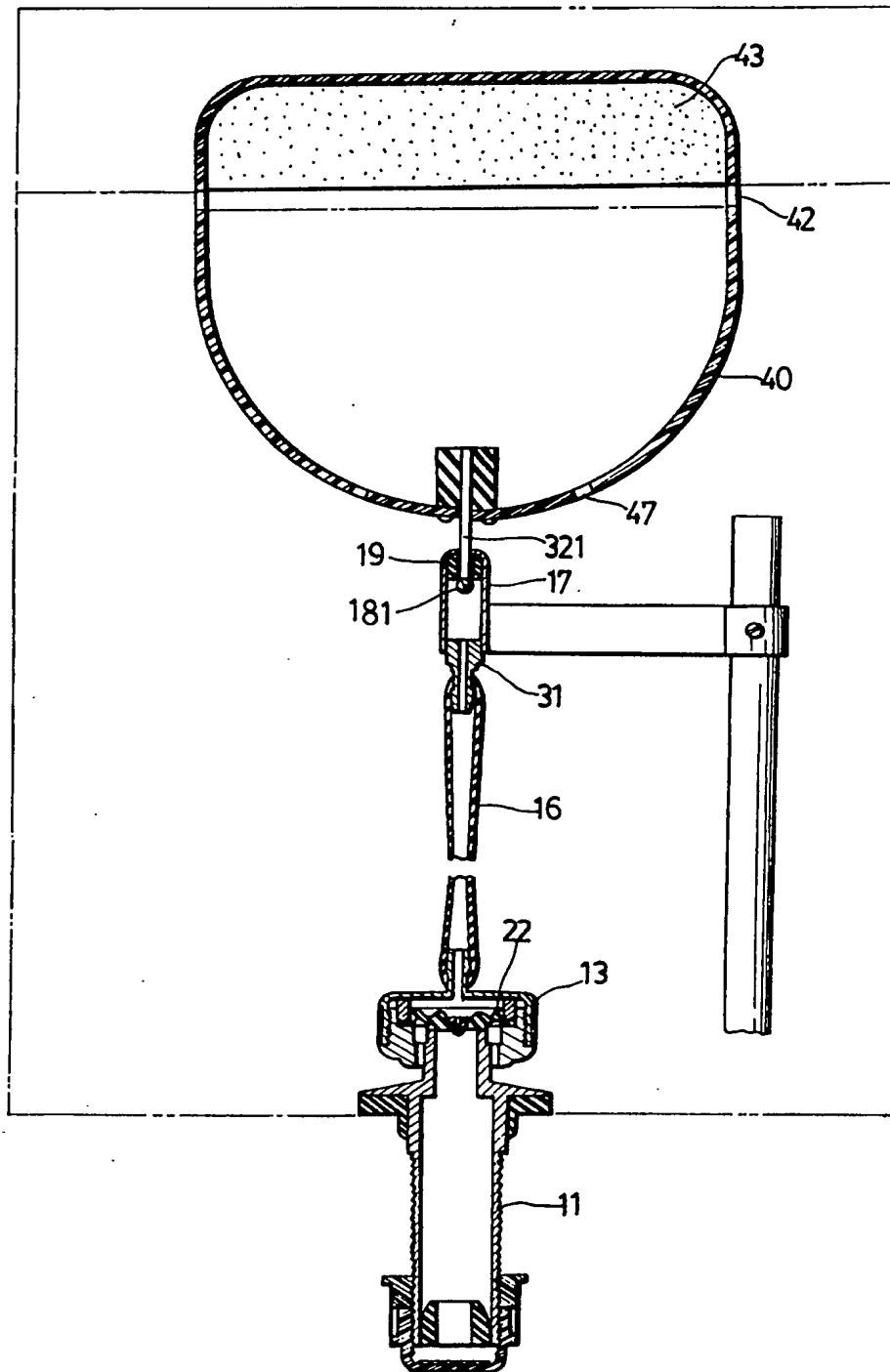


FIG. 2



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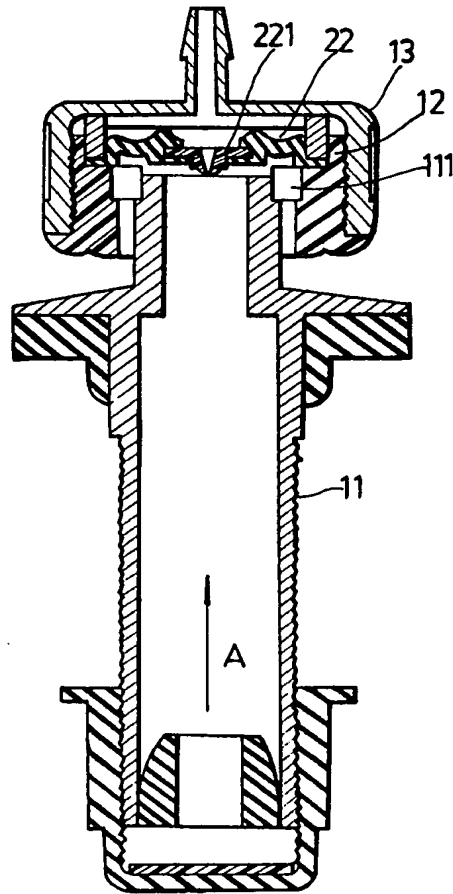


FIG. 4

SPECIFICATION

Float controlled valve

5 This invention relates to a float controlled valve and particularly concerns a float controlled valve with improved construction capable of exactly shut the inlet port as soon as the water achieves a given level in the water tank of a toilet set.

10 A conventional float valve commonly used the domestic situations involves an inlet pipe, a valve, a float to control the valve, and a plug at the upper end of the flush pipe, which can be triggered open to allow the water to flush through the flush pipe. Such structure is bulky and defective. Up to now, many improvements have been made in this field, the one most related to this invention is shown in Fig. 1, as illustrated, the valve device comprises a valve housing 3 defining a chamber having an inlet port 21 adapted to be connected to an inlet pipe 2 to the cistern (not shown), a filtrating means 23 usually being mounted intermediately of the inlet pipe 2, the outlet port 41 from the chamber having a valve seat 7 surrounding the port, a cap member 5 including an extending portion 51 in which a raising stem 52 is pivotally mounted, the diaphragm 4 having orifices 45 capable of allowing the water to flow into the chamber 3 under the action of the thrust of water which forces the valve member to separate from the upper end of the outlet pipe 1, with most water flowing into the outlet pipe 1 and a small portion of water flowing into the extending portion 51 via the orifices 45, the raising stem 52 connected with a float 53 at its upper end and a cork member 521 at the lower end adapted to block the opened upper end of the extending portion 51 when the water level in the cistern has been raised to a given level that the float 53 become water-borne, subsequently, the water in the extending portion 51 flows downward to cause the valve member to re-seal the outlet port, in this position to await the next flushing cycle. This type of valve device, however, is not very satisfactory especially when being used in the area near the source because the water pressure is too high in that area and thus the feeding water has a strong thrust. Therefore, the float sometimes can not overcome the thrust of water to lower to an open position. Accordingly, the operation is affected by the water pressure of the water supply.

Viewing the aforesaid, it is a general object of this invention to provide a float controlled valve which can be operated without regard to the water pressure, as a result, the water inflowing and outflowing can be controlled more exactly.

It is another object of this invention to provide a float controlled valve which equipped with a float the weight thereof can

be varied with the water level.

It is a further object of this invention to provide a float controlled valve which can be mounted versatily with respect to the interior of a cistern.

70 According to the features of this invention, in a float valve for a cistern or tank capable of automatically open or shut the inlet port of feeding water, with the structure thereof includes a valve housing defining a chamber having an upper chamber having open upper end and a lower chamber, the lower chamber provided with an inlet port which is connected to an inlet pipe of the cistern, and with an outlet port having a valve seat surrounding therearound; a diaphragm having opening being mounted on the valve seat and abutting against the valve seat when the valve being held in a closed position, during a period of water inflowing, the diaphragm maintained convexly to under the thrust of water to leave a space between the valve seat and the diaphragm, and allowing the water to flow into the cistern via the space and the outlet port, with a portion of water admitted into the upper chamber communicating with the cistern to develop a pressure therein; a rising stem having a cork on its end being pivotally mounted within the upper chamber and carrying a float on the upper end thereof, when the water raised to a given level, the float can be buoyed to a water-borne position and carrying the cork upwards to close the open end of the upper chamber, the water in the chamber then thrusting downwards to press said diaphragm and shut said inlet port, characterized in that said float having an upper section filled with water-proof material of a density extremely small compared with the water so that said upper section can rest over the water surface when the water of the cistern has raised to an upper level; a first opening positioned beneath said water-proof upper section; and a second opening positioned on a relatively lower section, the water when raising to level with said first opening will flow into said float and therefore the weight of the float can be increased enough to overcome the vertical force exerted by the water in said chamber upon a flushing action of the cistern being effected and the water level in the cistern suddenly lowered.

According to another aspect of the invention, there is a flexible tube between the upper chamber and lower chamber for communicating the two.

In order that the present invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which;

Figure 1 is a cross-section view of a conventional float controlled valve used in a cistern of flush toilet;

Figure 2 is a cross-section view of a pre-

ferred embodiment of the float controlled valve according to this invention, with the cistern shown in broken lines and the water therewithin in a low level;

- 5 *Figure 3* is a similar cross-section view as shown in *Fig. 2* except that the water is shown in a high level;

- 10 *Figure 4* is a cross-section view similar to *Fig. 2* for more clearly showing the state of water flowing into the chamber in a larger scale.

- Referring now to *Fig. 2* and *Fig. 4*, the valve device includes a valve housing 13 connected with a flexible pipe 16 through a coupling tube 31, on the end of the coupling tube 31 opposite to the flexible pipe 16 a hydraulic tube 17 is mounted to receive water therein and communicated with the cistern, a lever 321 is movably inserted in the hydraulic tube 17, the lever 321 having a float 40 and a plug member 181 attached respectively the upper end and lower end thereof.

- The flexibility of the pipe 16 makes the mounting position of this valve less restrictive, for example, the valve housing 13 can be mounted on the side wall of the cistern.

- As best shown in *Fig. 2*, an inlet pipe 11 is connected to the lower end of the valve housing 13 and a portion thereof passing through the valve housing 13, the flowing direction of water is indicated by an arrow A. The valve seat is surrounded by an outlet port 111 to communicate with the cistern, a diaphragm 22 made of resilient material is peripherally held on the valve seat 12 to normally seal the outlet port 111 of inlet pipe 11, according to the preferred embodiment, the diaphragm 22 is provided with a hole, with a funnelled member 221 having a shape conforming to the hole to be fitted therein, the funnelled member 221 made with a arcuated profiled lower end. The impurities included in the water, when being brought into contact with that end, are liable to be impeded from flowing into the interior of the valve chamber. Even though they enter the valve chamber, the water flow will push them through the pipe 16, the coupling member 31 and the hydraulic tube 17 to be eventually discharged from the opening of the connecting member 31 to the cistern. Accordingly, the possibility of jamming is extremely decreased.

- As described above, the float 40 is mounted with respect to the hydraulic tube 17 with the associated lever 321 inserted therein, and the hydraulic tube 17 is connected on the upper end of the connecting member 31. The plug member 181 on the end of the lever 321 is movable from an open position to a closed position with respect to the hydraulic tube 17 when the water has raised to a given level in the cistern. It is noted that the hydraulic tube 17 is communicated with the cistern through the opening 19 until such a given level of water is achieved

and the plug 181 stops up the opening 19.

- The float 40 is provided with holes 41, 42 respectively located in a lower and a higher position of the float 40, through the holes 41, 42 the water can flow into the float 40. As shown in *Figs. 2* and *3*. The holes 42 are immediately beneath a water-proof piece 43 filled up the upper section of the float 40, which is made of impermeable light-weight material such as the polystyrene foam, with aid of the water-proof piece 43 the float 40 can be buoyed more easily.

- For the benefit of description, the closed position of the valve is taken as reference position, in this position the diaphragm 22 is in abutment with the outlet port 111 and thus access to the cistern is closed. During a period of water inflowing, the diaphragm becomes convex under the acting of the thrust of feeding water, herefore, the water can flow into the cistern via the space over the inlet pipe and the outlet port 111. A small portion of water is admitted to the valve chamber via the tapered hole of the funnelled member 221 and then into the hydraulic tube 17 herein to develop the pressure needed to thrust the diaphragm 22 downwards. When the water has raised to the height of the hole 41, it flows into the interior of float 40 with a rate slower than flowing into the cistern. As soon as the water achieves the level of hole 42, the float 40 becomes water-borne and brings the lever 321 upward to block the opening of plug 32. at the same time, the water received in the connecting member 321 flows downwardly through the flexible pipe 16 to press the diaphragm 111, the water then will not further flow into the cistern until a flushing cycle is triggered.

105 CLAIMS

1. A float valve for a cistern capable of automatically opening or shutting the inlet port of feeding water, including a valve housing defining a chamber having an upper chamber having open upper end and a lower chamber, the lower chamber provided with an inlet port which is connected to an inlet pipe of the cistern, and with an outlet port having a valve seat surrounding therearound; a diaphragm having opening being mounted on the valve seat and abutting against the valve seat when the valve being held in a closed position, during a period of water inflowing, the diaphragm can spring convexly to leave a space between the valve seat and the diaphragm under the thrust of water, and allowing the water to flow into the cistern via the space and the outlet port, with a portion of water admitted into the upper chamber communicating with the cistern to develop a pressure therein; a rising stem having a cork on its end being pivotally mounted with the upper chamber and carrying a float on the upper end thereof, when the water raised to a given

level, the float can be buoyed to a water-borne position and carrying the cork upwards to close the open end of the upper chamber, the water in the chamber then thrusting
5 downwards to press said diaphragm and shut said inlet port, characterized in that said float having an upper section filled with water-proof material of a density extremely small compared with the water so that said upper section can rest over the water surface when the
10 water of the cistern has raised to an upper level; a first opening positioned beneath said water-proof upper section; and a second opening positioned on a relatively lower section, the water when raising to level with said first
15 opening will flow into said float and therefore the weight of the float can be increased enough to overcome the vertical force exerted by the water in said chamber upon a flushing
20 action of the cistern being effected and the water level in the cistern suddenly lowered.

2. A float valve for a cistern capable of automatically opening or shutting the inlet port of feeding water as claimed in Claim 1,
25 further characterized in that a flexible tube is connected between said upper chamber and lower chamber to communicate the both chambers.

3. A float valve for a cistern capable of automatically opening or shutting the inlet
30 port of feeding water as claimed in Claim 1, further characterized in that said diaphragm is provided with a central hole and a member provided with tapered through hole is fitted in
35 said hole.

4. A float valve for a cistern capable of automatically opening or shutting the inlet
40 port of feeding water substantially as described above with reference to the accompanying drawings.